MASTER OF SCIENCE
IN
COMPUTER SCIENCE

COMPUTER-AIDED RECOGNITION OF MAN-MADE STRUCTURES IN AERIAL PHOTOGRAPHS

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Aerial image acquisition systems are producing more data than can be analyzed by human experts. Most of the images produced by remote sensing satellites, including military ones, never get seen or inspected. In this work, automated detection and recognition of buildings in aerial photos is explored. Connectivity analysis is performed on graphs derived from line segment representations of the original images, obtained with the use of the Radon Transform. The model is experimentally validated using 2-meter panchromatic aerial photographs from the National Aerial Photography Program (NAPP), which is a marginally adequate resolution for the recognition of small buildings.

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Computing and Software

KEYWORDS: Aerial Photograph Analysis, Pattern Recognition, Imagery Intelligence

DYNAMICALLY DETERMINING DISTRIBUTION STATISTICS IN A DISTRIBUTED ENVIRONMENT

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Currently, the Department of Defense runs its special purpose applications on dedicated hardware i.e., on "stovepipe systems." Such hardware has inherent disadvantages. They have an inability to handle the resource contention that often occurs upon the influx of a large number of applications. A new application needing to use a given resource must typically wait for any preceding applications to first finish their use instead of searching out another capable resource. An even worse scenario is when the system fails and no applications can run until the system is repaired and brought back on-line. In all the cases, important decisions can potentially be delayed or made without important information. The Management System for Heterogeneous Networks (MSHN) will mitigate these deficiencies. The goal of MSHN is to manage several different types of applications across a changing heterogeneous network. MSHN determines the best resource on which to run an application based on both the application's and overall system's Quality of Service (QoS). The focus of this thesis is to write and demonstrate for MSHN the worth of an algorithm that can determine and update distribution statistics for the end-to-end QoS resource usage of an application

program. These distributions are vital in assisting MSHN in the scheduling and rescheduling of applications across a network.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Resource Management System, Distributed Systems, Client Library, Resource Monitoring, Stochastic Algorithms, Distribution, Heterogeneous Computing

INTERNET TELEPHONY

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During the mid- '90s, data and voice began to merge, propelled by advances in compression technology. The ubiquity of routed Internet Protocol (IP) networks, and the desire to trim telephony costs are the major driving forces of the deployment of Voice over IP (VoIP).

One major advantage of VoIP technologies is that they leverage existing network resources and dramatically reduce, or eliminate telephone costs. If there is an existing Wide Area Network (WAN) then VoIP could be employed over the WAN. However, a WAN link may not be available at each node location. Then only local point of presence (POP) for router based Internet connectivity would be required for VoIP over the Internet. The Internet could be the part of the backbone for the routing of the voice packets.

The advantages of deployment of VoIP are evident. The issue of whether or not to deploy VoIP is more concerned with technical implementation and Quality of Service (QoS) that with a cost-benefit analysis.

This thesis analyzes some of the technical issues surrounding the use of Internet Telephony. Specifically, the Internet Architecture and required QoS for reliable voice, and issues that arise from a dynamic network such as the Internet, and both software and hardware approaches to workstation solution to Internet Telephony.

DoD KEY TECHNOLOGY AREAS: Command, Control, and Communications, Computing and Software

KEYWORDS: Internet Telephony, Voice Over Internet Protocol Networks